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AN INQUIRY INTO THE FORMATION OF HABIT IN MAN.

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BEFORE now passing on to enquire into the nature of habit, let us pause for one moment to consider the wisdom displayed by fortuitous evolution (if such, indeed, be our origin) in the great fact that all the processes in our body are of a reflex or automatic nature that are connected with the mechanism of life, and are not subject to the control of our will, but proceed in a large measure even without our consciousness; while on the other hand all the actions of physical life or the expenditure of animal force is placed in the direct control of our will; so that while we have little or no share in the accumulation of our life capital, we have a large control over its expenditure. I do not say "entire," because some is used in carrying on the natural functions of the body. Were the fact otherwise, and our will had to control the processes of physical life, life would indeed not be worth living, and intelligent existence an impossibility. The voluntary and non-voluntary systems form, as a whole, two well-marked centres of government, each having at its command the necessary nerves, muscles, and organs. In the former case the nerves are white and the muscles striped, in the latter the nerves are mainly grey or non-medullated, and the muscles plain or smooth.

What we have now to consider is how, in the evolution of higher intellectual life, we have the power at will to change voluntary into involuntary action, to an almost unlimited extent, by the formation of habits; a process important to be understood, and of the greatest bearing on the well-being and progress of the race?

What habit is.—Having therefore now briefly touched on a few of the leading points connected with the ordinary action of the nervous system, we proceed to consider the direct

subject of this Paper, "the formation of habit in man." Let us first of all see what we mean and understand by "habit."

It is difficult to conceive of habit with reference to inanimate objects, and the word is no doubt to some extent inapplicable, and yet it is an interesting question as to what are the limits of its sphere of action.

Are the very laws of motion the result originally of habit? Are the chemical combinations of elements and the formation of different constant natural compounds and mixtures the result originally of long repeated repetition forming at last habits with cast-iron bonds that cannot be broken? Again, do we not see in an old dress, even in a room, a something that speaks of habit, an adaptability of shape and crease from constant wearing and use, or of fittings and furniture, that cannot be seen in a new coat or in lodgings? Does not an old violin that has been the property of some great master (not only made by some great maker) retain in its very fibres the habit of resounding to the grand chords he struck with far greater ease than any instrument that had not acquired this "habit" by long use? Passing on to living things. Do not trees acquire habits of growth from their environment, and in the lower forms of animal life does not this open up the whole of the great question of the formation of natural reflexes or automatic action and instinct? Are the rhythmic pulsations of the jelly-fish or the movement of an amoeba the outcome of purely reflex action, or were they at first voluntarily acquired habits passing by long use into hereditary reflexes?

In the marvellous labours of the ant and bee instinct seems to have reached its apogee. Do they, as Romanes suggests, speak to us of a lapsed intelligence that having by long use formed all needed habits, has ceased to act when these have been crystallized into instincts? These questions, fascinating and interesting though they may be, are unanswerable in our present state of knowledge.

Habit in man, as generally understood, means an act or thought, or sensation, or any combination of these, simple or complicated, that has been sufficiently often repeated to no longer require the same intelligence and will-power for its execution that were at first needed. It thus becomes an acquired or an artificial reflex.

Nearly all natural instincts in animals have thus to be formed as artificial reflexes in man. In man artificial habits formed at will replace instincts of a fixed character, or, if you please, voluntary habits replace automatic habits. Routine is living by habit. We sow acts and we reap habits; we sow habits and we reap character; we sow character and we reap destiny. Habit has well been called the railroad of character. Habit is physical memory. Memory is psychical habit. Character is organized habit. It is wonderful to note that even fixed habits that have passed (as we have suggested) long since into instincts or reflexes, can be modified by environment. It is the habit of all ova to build organisms in accordance with certain exact laws. But the ovum of a working bee that would produce a working bee is made to produce a queen bee by altering its food and feeding it on royal bee bread.

The force of habit.—The force of habit is, however, very great, and is only short of natural reflexes, which are omnipotent in the body. No power of mind or will can stop the beating of the heart or the movement of the stomach, and a habit may be so formed as to be almost as difficult to check. Darwin found he had acquired in common with most men the habit of starting back at the sudden approach of danger, and no amount of will-power could enable him to keep his face pressed against the plate glass front of the cage of the cobra in the Zoo while it struck at him, even though he exerted the full force of his will, and his reason told him there was no danger.

The Duke of Wellington is credited with the dictum that habit is as strong as ten natures, and certainly to see what a soldier will do and is worth in a campaign when seasoned and well drilled, compared with a raw recruit, one feels that this statement is under rather than over the mark; for he owes all his value to "habit"! If an established habit is broken by the will the lower centres rise up in rebellion, so accustomed are they to the easy yoke of that which has been often repeated, that the effort of control required, as is the process of breaking a habit over lower physical centres, often extremely painful.

Physiology of habit. How formed.—Referring to the description of the brain in childhood it will be remembered that

it is something like a wide common over which are traces of many ancient tracks but no fresh paths. Habit strikes out fresh paths if the result of education, or re-forms old ones if they are the outcome of heredity. In all cases of true artificial reflexes or habits the will is the starting point, and a purely voluntary action takes place. This is repeated continually until, as C. Bastian and others believe, not only is a well defined brain path established between the arbitrarily associated groups of cells, but this path is physiologically present in the brain in the form of nerve threads or fibres; or in the graphic language of Dr. Michael Foster: "The will, blundering at first in the maze of the nervous network, gradually establishes easy paths. When once this is effected the slightest impulse seems to start the nerve current along the whole of the associated groups and produce the habitual action. The nerve current follows this route not now because it is guided by intelligence, but because this route offers the least resistance from habitual use."

There are one or two interesting points in the formation of a habit.

In the first place the action must never be varied even for a day. If it be the learning of some steps in dancing they should never be changed till fixed in the brain. Again, it is of great importance, and this has a very wide application to the training of children, that the habit be taught and executed accurately. If the steps are taught in a slovenly way they will always be executed in a slovenly manner.

If a child learns sometimes that two and two make five, and at other times that they make four, there will always be confusion in the mind or brain paths as the case may be.

Again, there is a great tendency in the young for all repeated acts to become fixed habits, as in making grimaces, or the use of slang words.

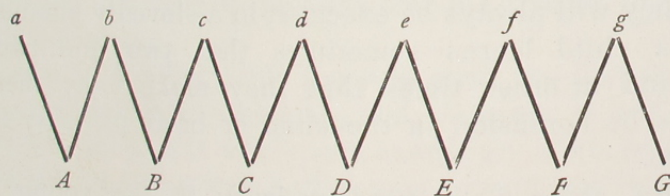
In those whose mind is not developed this is far more marked. All such cases are creatures of strong habit and routine, and they like everything done at the same time each day. Miss Martineau tells us of an idiot who required any new thing done to be repeated at the same hour each subsequent day. His hands were washed and nails cut at 11.10 one morning, and next morning at exactly the same

hour he came to have it done again, and yet he had no knowledge of time, and could not tell it on a clock. There must have been some very accurate unconscious cerebral process that told him when the twenty-four hours had elapsed. If seven sweets were given him one day, he would take neither six nor eight the next.

Again, fresh nerve paths tend to consolidate apart from actual repetition. A new task learned on the Saturday becomes easier to perform each morning than it was the night before, and easier still on Monday morning than it was on Saturday evening. The Germans go so far as to say that we learn to skate in summer and to swim in winter. What is exactly meant is that having been taught skating one winter, we go on learning it unconsciously all through the summer, or that we begin much better next winter than we left off at the end of the preceding one.

Attention in the formation of the habit seems greatly to deepen its impression on the brain, and make it much more easy to establish. A good memory, which is a physical habit, is thus established by attention.

Results of formed habit.—A formed habit of average complication produces a sort of reflex peristaltic nerve current between the associated groups of cells. Supposing it is a question of learning the clog dance and alternately tapping the floor with the toe and heel in rapid succession, the process is somewhat like this—



The small letters being sensory, and the capitals motor centres connected by the nerve threads of habit. The will starts the nerve for this step by placing the toe on the ground by an impulse from *a* to *A*. Before the habit was formed this would be all, but now it is but the first link in a long connected chain, along which the nerve current passes with great rapidity. The moment the toe strikes the ground, the sensation is passed to the brain along *A b*, and this is reflected as a motor impulse to strike the heel along *b B*.

This in its turn producing a sensation along *B c*, starts the motion of toe-striking along *c C*, and thus the motion continues till stopped at *G* by the fiat of the will.

Once a habit is well established on such lines as these, the interference of will or mind only spoils its perfect action. Whenever knitting has become automatic, if you think about the formation of each stitch, you have to knit much more slowly, and are more liable to make mistakes. A fixed habit is thus deranged by volition.

The more fixed a habit becomes, the less of the body is required to execute it, and thus a great economy of force is effected. In commencing piano-playing, the young performer plays with her hands and arms, and body, and legs, and head, and often her tongue. As she forms a perfect artificial reflex, less and less of the body is moved, until at last it is literally nothing but the hands and wrists that are engaged, the brain being at perfect rest, or thinking of something else altogether. Habit is thus of great economic value.

Habit, which is physical memory, is of such importance to character that a spinal cord or brain without such memory is either idiotic or infantile. Artificial reflexes last long if well formed. In early life Robert Houdin, the conjurer, trained himself in the difficult habit of reading aloud while keeping four balls going in the air. He did not practice this for many years, and yet after thirty years found he could still read and keep three balls going. Any one who tries this feat will understand its difficulty.

Artificial reflex habit resembles respiration, and still more coughing, in that these occur naturally by reflex action, but can be modified or stopped by the will.

Habits, influencing the general constitution, as even Weissman partially admits, strongly tend to become hereditary. This is clearly seen, for instance, in the love of strong drink.

When to form habits.—The easiest and best time to form habits is in the growing structure in early childhood, notably from fifteen years of age. The earlier the period that habits are formed the more lasting are they, and reappear at a late period of life when other habits acquired since have passed away. Plasticity of brain is essential, that is,

tissues weak enough to yield to influences, and yet strong enough to retain them. After the brain is fully developed, that is, after thirty, or perhaps later, to acquire new habits or to give up old becomes alike more difficult. In old age we find, as we have said, that those habits that are acquired last are lost first. As a rule, personal habits are acquired before twenty, professional habits between twenty and thirty.

Physical habits.—Let us now consider a few leading habits, physical, mental, and moral.

Physical habits that modify natural reflexes. Thus, one may get accustomed by degrees to digest indigestible things, or to tolerate an excess of alcohol, or to blush very readily, or not at all, or to vomit at the sight of certain articles of food, and so on.

Or physical habits that are new products altogether; that is, real artificial reflexes. These are innumerable; they extend through all our being, are insensibly being formed whenever an act is repeated sufficiently often, and are often only detected when it is too late to alter them.

They are amazing in their intricacy and variety as well as in the extraordinary ease they give when once firmly established in the performance of the most difficult and at first impossible tasks.

The old adage,—

“If at first you don’t succeed,
Try, try, try again,”

simply means, if a thing is too hard to do, establish a habit and you will accomplish it.

I would repeat here that in what we call voluntary actions all we do is to will a result, as of raising the hand to the mouth. The ease with which we do it and indeed the power to do it all arises, not from our will-power being able to control the so-called voluntary muscles, but in their being already associated for the purpose by long established habit. Where no such habit exists an action becomes well nigh impossible, however strongly it may be willed. By long habit, hereditary in nature, we always swing our right arm with the movement of our left leg, and the left arm with the right leg. Let any one *will* the contrary, *i.e.*, to move the right arm with the right leg and *vice versa*, and

however strong the effort of will may be, they will find in the end that it is powerless to overcome this established habit, except most awkwardly, and for the shortest time. The intense difficulty of the one movement and the perfect ease of the other, both in themselves equally easy, is most striking.

Let any one *will* to play the violin, or piano, or to skate, or swim, or in short to do anything that requires the formation of habits, and they will see it is impossible; and that to do so at all a habit must necessarily be formed for the very purpose: and then behold! the thing which was impossible before is executed with almost contemptuous ease. Few of us know what bundles of habits we are, and we imagine many of our actions to be voluntary which are really artificially automatic. Let any man over forty try to wash and dress himself in any but the accustomed order, and he will see what difficulties arise. He may not know the order in which he washes his face, but the hands know. He cannot tell which arm is put into the coat first, but the arms know. He cannot tell which foot is put into his stockings first, but the feet know. Before I begin to dress, from long habit I am almost compelled to pull up the blind a certain exact height, and if I fail to do so, I feel an inward impulse that is not satisfied till it is obeyed.

Consider the habit of shooting; the perfect ease with which the trained sportsman, the moment the grouse rise, aims and fires well nigh automatically at the birds, who themselves have acquired *fin-de-siècle* habits (as Sir Joseph Fayrer told us) in learning to avoid the telegraph wires as they fly, which in earlier times they always struck against.

Look what an automaton a soldier becomes; so that the very dinner he may be carrying, as Huxley tells us, is dropped unconsciously into the gutter if he hears that magic word “Tenshun,” which in his mind is so associated with his little finger and the seam of his trousers that his hands at once fall to their allotted place. But time would fail us to describe the marvels of physical habits, and we must pass on, especially as we have still greater wonders in store.

Mental habits.—Habits of thought are as truly and readily and often unconsciously established as habits of body, and indeed the two are sometimes inscrutably mixed; as in

character as displayed in handwriting as well as in the lines that habit has traced upon the face, rendering physiognomy a true science. We have also ideal habits, and here as elsewhere habit means ease.

Attention may be deliberately manufactured as a habit by the inattentive. For this is the charm and value about habit; that if we begin soon enough, and particularly in childhood, and pre-eminently before the age of ten, we can absolutely engraft into the child's character many of those valuable mental qualities which it may lack. The habit of *enquiry* is easily acquired in young life, and is invaluable in after years, and simply means going through life with one's eyes open instead of shut.

The habit of *perfect execution* is invaluable, but must be taught early. Perhaps no other mental habit leads to greater success in every calling in life. *Sloyd* is the physical means by which this habit is best taught in childhood; for the essence of *sloyd* is not what is made, but that it should be perfectly finished in all its parts.

Industry is another invaluable habit.

Moral habits.—But we must pass on to moral habits. Now if we wish to produce some valuable moral quality in a child, the easiest way to do it is to establish the quality as a habit; the most difficult and uncertain is to depend on direct precept. To be always telling a child to be truthful is a poor way of making him so; but to accustom him to use his words in talking exactly as a painter uses his colours in painting, so that his word picture shall be a faithful copy of what he is describing, painted in words instead of water colours; this persevered in, will give him the habit of truthful speaking as a fine art, apart from its moral value, which of course will only strengthen the habit. In a similar way most moral qualities can be formed as mental habits—deliberately, surely, and easily, as compared with any other method; and if sufficiently well established, it is harder to depart from them than to display them. Thus decision, self-control, obedience, self-respect, unselfishness, courtesy, reverence, can, one and all, be formed by frequent repetition in early life. We know nothing of the mind tracks that ensure their permanence; all we know is that they are as sure and lasting as physical habits.

In this connection those words of Holy Writ derive an added meaning: "Train up a child in the way that he should go, and when he is old he will not depart from it," for we would add "because he cannot."

Value of habit.—And now in bringing these fragmentary remarks to a close, let me point out first the value of habits as a whole, and lastly their drawbacks; for they have drawbacks.

Habit is economical. It has been well described as using the interest of nerve energy instead of the principal. The absence of fixed habits is misery, and is the source of nearly all indecision of action and of character.

Habit alone enables things otherwise impossible to be accomplished, such as playing the flute, violin, or piano. But for habit we should spend a whole day in doing one or two things with great fatigue of mind and body, such as the continued effort to balance the body in the erect attitude by sheer force of will, or to read a book, or to walk.

Habit gives speed, accuracy and ease. The will, as we have seen, can only set habits in motion, and is powerless to act when such do not exist. The unconscious ease of a well-formed habit has been well illustrated by fixing a wafer on a looking-glass, and while keeping the eyes fixed on it, moving the head in a circle. The eyes will be seen to be moving in every part of the orbit, but cannot otherwise be known to move at all; so unconscious and without effort is the action of the complicated muscles that move them, which by the way are all so-called voluntary muscles.

Habit forms character, or at least a good deal of it. Up to a certain point our character is formed *for* us by heredity, beyond this it is formed *by* us by habit. Skill is entirely the result of habit. To seek to be ambidextrous is folly. Specialism is everything in the body, and the habits that suit the right hand do not suit the left, nor the left the right. The left hand is just as awkward with a knife, as the right is with a fork. Some callings may require a certain measure of ambidexterity, but it is against all true development, and is common in idiots.

Habit adapts us to our environment, without which we should die. A bookbinder in a little den in Paternoster Row is as happy and healthy as a farm labourer in the Midlands.

Each has become adapted to his environment by habit. Let them change places, and the chances are both will die. Sir Charles Lyell tells us of some English greyhounds exported to South America, for coursing hares on a raised plateau some 6,000 feet high. They were useless on account of the unaccustomed rarity of the air, but they produced pups who could course as well as the dogs of the country from a formed habit. Some habits are the offspring of necessity, others of caprice.

Drawbacks of habit.—But there is another side to habit that must be alluded to in conclusion, and that is its drawbacks. An illustration will explain this. In suburban dwellings, with a garden and locked gate in front, there is often an arrangement by which the gate can be opened from the house by pulling a handle that raises the gate latch. When the gate bell rings in the hall it is equivalent to a sensation reaching a conscious brain. The maid then comes and looks out to see who is there before she pulls the handle. If it is a person she wishes to admit, she pulls the handle which lifts up the gate latch. The maid is the mind which considers the impulse received by the brain, and does not send a motor impulse until the will determines what shall be done. This is a type of a pure voluntary action.

If, however, to save herself trouble, the girl fastens the wire that should ring the bell round a pulley in the hall to the wire that opens the gate, the result will be that when a man pulls the bell handle, he rings no bell but opens the gate by a reflex action. This is the formation of an artificial reflex, only it cannot be thus made at once by the will but must be gradually formed by frequent repetition. The advantages of the voluntary action were—the maid could admit whom she pleased, and none could enter without her knowledge and consent. The drawbacks were—it took her nearly all her time to answer the bell, and the man had always to wait for a time at the gate.

When the action is changed into a reflex one, the advantage is that the man is never kept waiting, for pulling the wire opens the gate, and the servant never has to answer the bell. The disadvantage is she no longer knows or can control who enters the garden. Habits thus may become our masters. There is a story of a lady engaged to play at a

concert who took too much at supper, and the result was she not only kept on playing too long, but whenever her fingers rested on the keys she started playing like an automatic musical box, and could not be stopped. Girls who drill holes in buttons in Birmingham are said during their dinner hour as they pass along the streets to be constantly continuing unconsciously the same movements with their fingers.

Habit is often used to excess with bad results. Hammer-palsy arises from incessantly using the hammer in making knives till the associated group of cells is worn out, and paralysis sets in; writers' cramp is another illustration.

Habits that have become unconscious may be put in action by using wrong stimuli. When dressing for dinner one frequently winds up one's watch by mistake, and some in changing their clothes have gone to bed unconsciously.

A bad habit is a terrible thing when thoroughly fixed. Swearing is a good example of this, and of the tenacity of a habit when firmly established.

Habit blunts the feeling both as to right and wrong, and as to pleasure and pain, and when purely automatic abolishes it. A man may get such an inveterate habit of lying as to lose all sense of evil. So with other sins.

A person travelling or yachting takes great pleasure in it at first, but if he is ever doing this and gets into the habit of the thing, it loses its charm.

Games amuse when occasionally played, but when they are incessantly pursued, and an automatic habit is established, a large amount of the pleasure goes.

Habit may induce error, as when at the close of the year from long habit the same date is carried on into the next year, until the new habit overcomes the old.

Such then are some of the pros and cons of this important variety of brain action, which is now left for the consideration of parents, who will doubtless find in it a most powerful lever in child-training. And if at first the application of some of the principles here laid down seem difficult and arduous there is no cause for discouragement, for as we have shewn, a thing is only hard because it is strange. As we get used to training by means of fixing habits, we ourselves acquire the habit of so doing, and our work thus becomes easier and more perfect the longer we persevere.